

What is claimed is:

1. A semiconductor module comprising:
 - a package substrate;
 - a plurality of power switching device chips having top
5 surfaces and back surfaces and being mounted by flip chip
bonding above said package substrate while letting said top
surfaces face said package substrate;
 - a drive-use integrated circuit ("IC") chip mounted by
flip chip bonding above said package substrate, configured
10 to drive gates of transistors formed in said plurality of
power switching device chips;
 - a plurality of heat sinks disposed above said back
surfaces of said plurality of power switching device chips;
and
 - 15 a resin member configured to seal said plurality of
power switching device chips and said drive-use IC chip as a
single package.
2. The semiconductor module according to claim 1,
wherein at least one of said plurality of heat sinks is
20 insulated from said drive-use IC chip and extends to overlie
said drive-use IC chip.
3. The semiconductor module according to claim 2,
wherein said drive-use IC chip is less in thickness than one
of said power switching device chips having its back surface
25 on which the heat sink extending to overlie said drive-use
IC chip is disposed.
4. The semiconductor module according to claim 3,
wherein said heat sink extending to overlie said drive-use
IC chip is flat.
- 30 5. The semiconductor module according to claim 1,
wherein said plurality of heat sinks are electrically
connected respectively to source electrodes or drain
electrodes of said back surfaces of corresponding ones of
said plurality of power switching device chips and also
35 electrically connected to terminals of said package
substrate.

6. The semiconductor module according to claim 1,
wherein a respective one of said plurality of heat sinks has
a one surface and a remaining surface on the opposite side
thereof, said one surface facing the back surface of a
5 corresponding one of said plurality of power switching
device chips, and wherein

said remaining surface is exposed to outside of said
semiconductor module.

7. The semiconductor module according to claim 1,
10 wherein gate electrodes and source electrodes are formed at
said top surfaces of said plurality of power switching
device chips, and wherein drain electrodes are formed at
said back surfaces.

8. The semiconductor module according to claim 1,
15 wherein said drive-use IC chip is not covered with the heat
sinks.

9. The semiconductor module according to claim 1,
wherein at least one of said plurality of power switching
device chips has a diode as built therein, said diode being
20 connected in parallel to one of said transistors.

10. The semiconductor module according to claim 1,
wherein said plurality of heat sinks are entirely covered
with said resin member.

11. A semiconductor module comprising:
25 a package substrate;
a power switching device chip having a top surface and
a back surface and being mounted by flip chip bonding at
said package substrate while letting said top surface face
said package substrate;

30 a driver IC chip mounted by flip chip bonding at said
package substrate, configured to drive a gate of a
transistor formed in said power switching device chip;

a heat sink being disposed above said back surface of
said power switching device chip and extending to overlie
35 said driver IC chip; and

a sealing member configured to seal said power .

switching device chip and said driver IC chip together as a one package.

12. A semiconductor module comprising:

a package substrate;

5 a power switching device chip having a top surface and a back surface and being mounted by flip chip bonding at said package substrate while letting said top surface face said package substrate;

10 a driver IC chip mounted by flip chip bonding at said package substrate, configured to drive a gate of a transistor formed in said power switching device chip;

15 a heat sink disposed above said back surface of said power switching device chip and electrically connected to said back surface and terminals of said package substrate; and

a resin member configured to seal said power switching device chip and said driver IC chip together as a one package.

20 13. A DC-DC converter including said semiconductor module according to claim 1.

14. A semiconductor device comprising:

said semiconductor module according to claim 1; and

25 a pulse width modulation (PWM) control IC chip configured to control driving of said gates by said drive-use IC chip.

15. A semiconductor device comprising:

a DC-DC converter including said semiconductor module according to claim 1;

30 a central processing unit (CPU) to which electrical power is supplied thereto by said DC-DC converter; and

another heat sink being disposed above said CPU and extending to reach a location covering said semiconductor module.